SCLEROTICO-CHOROIDITIS POSTERIOR,

WITH

CASES AND ILLUSTRATIONS.

BY

HENRY D. NOYES, M.D.,

Assistant Surgeon to the New York Eye Infirmary, corner of Second Avenue and Thirteenth Street.

Reprinted from the New York Journal of Medicine for March, 1860.

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SCLEROTICO-CHOROIDITIS POSTERIOR.

The examination of the posterior segment of the eye by means of artificial light reflected upon it, has brought to view many pathological conditions with which oculists were formerly imperfectly or not at all acquainted, and has imposed upon them new labors in endeavoring to establish their seat, their nature, their succession, and, so far as possible, their causes. When means of investigation have been but recently introduced, much obscurity must yet remain ; yet, before all the details have been elucidated, much is done in establishing a correct diagnosis, and important aid is offered in settling the question whether treatment is likely to prove beneficial. In revealing opacities of the transparent media, the crystalline lens, its capsule, and of the vitreous body, the ophthalmoscope is almost unerring. Specks and striæ in the lens are clearly seen with a dilated pupil, and the same is true of deposits upon the capsule. In one instance the diagnosis is rather difficult, namely, when the opaque spot is situated upon the centre of the posterior capsule, no other opacity being present. The reason is, that the speck is so close to the mathematical centre of the globe that when the eye is moved in different directions it can make but a very slight amount of motion, and seems to coincide with the reflex from the surface of the cornea. This difficulty can be obviated by looking from a point a little more sidewise, and also by *inspecting* the lens obliquely under light concentrated upon it by a double convex lens.

The existence of particles floating in the vitreous humor, whether shreds of fibrin, or blood-clots, or the presence of the cysticercus, or the more-diffused and less-discernible turbidity of the humor, is made known by the light of the ophthalmoscope.

The impairment of vision which sometimes follows iritis, where the pupil is not obstructed by lymph, and its margin but slightly or not at all adherent to the anterior capsule, is often well explained by the discovery of flocculi of plastic exudation into the corpus vitreum, proving that the inflammation had extended to the ciliary body. The examination of the optic nerve, the retina, and the choroid coat requires more careful inspection and a practiced eye.

To decide the nature of the discovered lesions is not always easy, and often, though sight is impaired, nothing is revealed to the most expert scrutiny. There are sources of fallacy to deceive the observer, and there may be functional disturbances which leave no visible trace. It is proper to observe that concentrated light should always be used with caution, not too

long protracted, and often only a very weak reflection—which, however, with a dilated pupil, will generally be sufficient.

Cases of sudden blindness, partial or total, often present the most striking appearances to the ophthalmoscope. Sometimes the loss of sight occurs at once, and remains in this condition; at other times it occurs at successive stages, while in the intervals, the vision remains stationary. The following case presents the latter features:

A. B., a man of about 45 years, born in Ireland, a porter, had noticed, six weeks before coming to the Eye Infirmary, that his sight began to fail. He was at that time indulging freely in intoxicating drink, and had long been given to intemperate habits. Notwithstanding the warning from his eyes, he did not abate his spree, and two weeks before coming to the Infirmary, he noticed another marked diminution in his sight. When he came for advice, his flushed face, tremulous hands, and fetid breath showed the depth of his potations. The eyes, to external appearance, showed nothing abnormal: the pupils active, the conjunctiva but little congested. He was unable to read large print with either eye, nor could he do his work, yet could guide himself on the street. Examined with the ophthalmoscope, the media were found clear, but in the substance of the retina were seen numerous streaks of blood. They were nearly all situated beside of, and running parallel with, the larger vessels, sometimes spreading over and concealing them. The streaks were disposed in a radiating form, and were generally not more than two or three times the breadth of a vessel. They did not occur upon the macula lutea, but were very near it both above and below. The hæmorrhages were not found in the peripheral portions of the retina, but confined to its central parts. In each eye was a single patch of larger size than the rest; in the left it was a little distance above the optic nerve, of irregular form, having about the breadth and twice the length of the diameter of the optic disc. The surfaces of the optic nerves presented an unnaturally rosy hue, and the vessels passing through them were turgid and thickly clustered together. This, then, was apoplexy of the retina. No traces were found of former extravasations, but it is fair to presume that such had taken place, and been absorbed.*

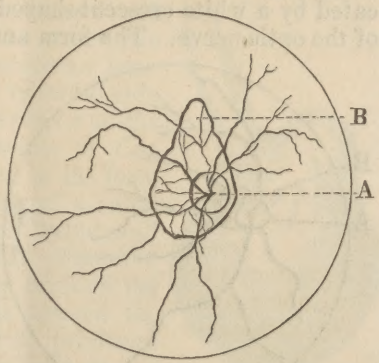
The two following cases are illustrations of one of the most frequent forms of disease presented to the ophthalmoscope; they show, moreover, how often persons are deprived of useful vision in one eye without being, for a long time, aware of it.

Case 1.—Mary J. B., married, aged 25, residing in Newark, on Thanksgiving-day was playfully struck in the face by her hus-

* After three months the patient was again examined and the blood had entirely disappeared—his vision had much improved.

band, receiving the blow upon the right eye. She was unconscious of any effect upon her vision until, in handling white clothes soon after, she found they appeared to be sprinkled with black specks, and then she noticed that she could see only very indistinctly. She had had no pain, nor could she relate any other symptoms. She was cupped and blistered, and took purgative medicine by the prescription of her usual medical attendant, but with little benefit. After four weeks, she came to the Eye Infirmary. She still had vision enough to go alone in the street. An ophthalmoscopic examination was not carefully made of the right eye, because it was deemed imprudent to submit it long to a strong light. The vitreous humor appeared to be hazy. It was, however, noticed that in the other eye there was a divergent strabismus, not permanent, but occurring when the patient made an effort to look attentively. In this eye was seen the disease called by Prof. Graefe, of Berlin, "sclerotico-choroiditis posterior," by others called staphyloma posticum. The media were clear, and the optic nerve healthy; but instead of appearing as a white or grayish disc upon a red ground, it was placed upon a glistening white surface, which reflected the light much more strongly than itself. The nerve seemed much smaller than usual, and the focus of the reflected image was brought closer than usual to the patient's eye. This white surface was limited by an irregular border, making a patch whose greatest breadth was upon the temporal side of the nerve, and its greatest length in a vertical direction. The form and proportion were something like this sketch.

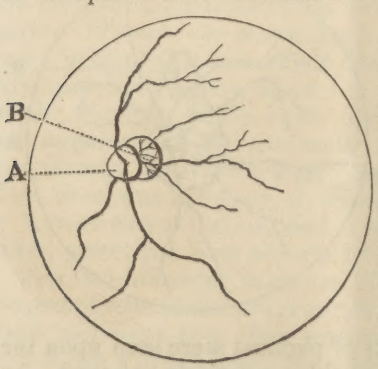
The contour of the optic nerve was darker than usual, and the border of the white figure likewise made dark by deposition of pigment. Across the white surface numerous fine branches of the vessels were running, and seemed as if due to increase in the vascularity of the membranes. This, however, was only because the normal vessels of the retina were brought into brighter relief by the surface behind them, and at the opposite border of the figure most of them again disappeared in the substance of the retina. Upon narrow inspection, a few specks of pigment were seen upon the white spot, and traces of the choroid not entirely removed. As has been stated, the eye was seen to be strongly myopic, and, upon testing the patient, this was corroborated. She could not



read print of ordinary size upon a card at a greater distance than four inches, and could read it when brought to within two and a half inches. It was impossible for her to discern objects distinctly across the room. She had not used this eye much for twelve years, and says that she first found its function impaired after recovering from small-pox. Her mother noticed then that her eyes had a strange and staring look. The probability is that the strabismus then began to be noticed, but this was only at a certain stage in the disease. The changes had probably been going on for some time previous, until the eye became so myopic, as well as amblyopic, as to interfere with the other which remained healthy. To get rid of the disturbance produced by the unequal refractive power of the eyes, the function of the left was involuntarily suspended, by allowing it to deviate from the axis of vision when the patient desired to see distinctly. Even now, where the previously better eye had become the worse, the habit of divergence on the part of the left eye remained.

The nature and progress of the injury to the right eye can not be more clearly stated, since the patient did not continue in attendance.

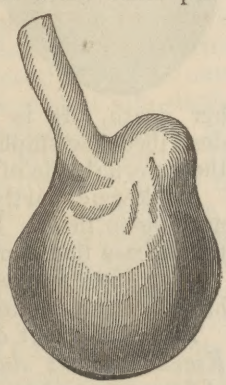
Case 2.—Thomas Bergen, æt. 28. In August last his left eye was destroyed by the explosion of a percussion cap. Some time afterward he came to the infirmary for advice respecting the remaining eye. Sympathetic irritation was found to be set up in it, and the injured globe was extirpated with a certain degree of beneficial effect. He was, however, extremely near-sighted, and this induced an ophthalmoscopic investigation. He was found to have sclerotico-choroiditis posterior, as indicated by a white crescent-shaped patch beside the outer border of the optic nerve. The form and relation were like the sketch.



The diminished size of the optic nerve and the vessels proved objectively the myopic condition of the eye. The border of the nerve next the white crescent was made black by deposit of pigment, and on that side the disc was not perfectly circular. It is easy to overlook the small spot where the choroid is wanting, in a case like this, and consider the whole as comprising the optic nerve. Fine capillaries could be seen crossing the atrophic crescent, and the remainder of the choroid showed indications of pigment maceration. The

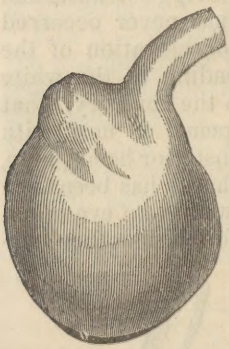
patient's reading distance was from two and a half to five inches for print of ordinary size. He could not tell a person's features at twenty feet distance. He had never observed any difference in his eyes prior to the injury in August. He used his right eye in the measurements necessary in his trade as carpenter, but says that for many years he had always employed the left eye in shooting a gun. This renders it probable that the right eye had long been the seat of the morbid changes. The patient was twice cupped and found his sight made clearer. After being about a fortnight in the infirmary, he left.

The disease to which these two cases belongs has been described generally under the name of staphyloma of the sclerotica, and supposed to be of rare occurrence in the posterior region of the eye. Wardrop says that he has never observed an example of it. Travers does not allude to it, neither does Mr. Tyrrell. The earliest description which I have been able to find is given by Scarpa, who found two specimens upon post-mortem dissection, and has left sketches of the exterior form of the globes. The appearances are so striking, that I am tempted to reproduce his figures and his descriptions. See Brigg's translation of Scarpa. London, 1818, page 399. "It has never occurred to me, indeed, even once, to see any tumor or elevation of the sclerotica, or its anterior surface, corresponding to the white of the eye, in the form of staphyloma; on the contrary, what may seem extraordinary, I have twice happened to meet with the staphyloma of the sclerotic coat in its posterior hemisphere, in the dead subject, where I do not know that it has been seen or described by any other. The first time was in an eye taken from the body of a woman 40 years old, for some other purpose. This eye was of an oval figure, and upon the whole larger than the sound one of the opposite side. On the posterior hemisphere of the eye, and on the external side of the entrance of the optic nerve, or on the part corresponding to the temple of that side, the sclerotica was elevated in the form of an oblong tumor, of the size of a small nut. And as the cornea was sound and pellucid, and the humors still preserved their transparency, on looking through the pupil there appeared within it, toward the bottom, an unusual brightness, produced by the light penetrating that part of the sclerotica, which had become thin and transparent where it was occupied by the staphyloma. When the eye was opened, I found the vitreous humor entirely disorganized



and converted into limpid water, and the crystalline lens rather yellowish, but not opaque. When the posterior hemisphere of the eye was immersed in spirits of wine, with a few drops of nitrous acid added to it, in order to give the retina consistence and opacity, I could perceive distinctly that there was a deficiency of the nervous expansion of the retina within the cavity of the staphyloma; that the choroid coat was very thin and discolored at this part, and wanted its usual vascular plexus; and that the sclerotica, particularly at the apex of the staphyloma, was rendered so thin as scarcely to equal the thickness of writing-paper. I knew that the woman from whom the eye had been taken had lost the faculty of seeing on that side some years before, during an obstinate ophthalmia, attended with a most acute and almost habitual pain in the head.

"The same observation I had an opportunity of making on an eye accidentally taken from the body of a woman 35 years of age, and politely sent to me from Milan by Dr. Monteggia, who has distinguished himself by his excellent medical and surgical writings. This eye was also of an oval figure, and larger than the opposite one. The staphyloma of the sclerotic coat occupied its posterior hemisphere on the external side of the entrance of the optic nerve, or on the side next the temple. The vitreous humor was converted into water; the capsule of the crystalline was exceedingly turgid with a whitish diluted fluid; the crystalline yellowish and less than natural; the retina deficient within the staphyloma; the choroid and sclerotic coats forming the tumor were rendered so thin as to admit the light. Dr. Monteggia could not furnish me with any thing positive respecting this woman's sight before her death. It is remarkable that in both the cases now described, the staphyloma of the sclerotic coat was situate on the external side of the entrance of the optic nerve."



Mackenzie partly quotes the above descriptions, but adds nothing to them. It may be remarked that he bestows upon the disease the name of sclerotico-choroiditis.

Lawrence alludes to cases figured by Von Ammon, but I have been unable to consult the work.

Professor Arldt, of Vienna, in writing upon short-sightedness, *Krankheiten des Auges*, 1856, p. 238, gives a detailed account of four cases where he made a dissection of the eyes, knowing that the individuals had during life been extremely near-sighted. The case most strongly pronounced was that of the

wife of a professor, who was for many years under his observation. The eyes measured respectively fourteen and thirteen and a half lines in antero-posterior diameter. The description of the morbid appearances it is needless to relate. These had advanced to an extreme degree, and the symptoms were as follows: "A. F. for many years had worn concave glasses of four inches focus, but during the last six or seven years had been obliged to use No. 3½. In early childhood, after an attack of measles, she became very near-sighted; for thirty years had often asked medical advice because of inflammatory and congestive symptoms which threatened amaurosis. In the left eye she had for four or five years shown the signs of amaurosis of the central part of the retina, inasmuch as she was able to see with only the lateral parts of the retina, no matter how closely the object was made to approach. Neither with concave glasses, nor by looking through a fine hole in a card, could direct vision with the macula lutea be made possible. For this reason I had during the last three years entirely prohibited the use of concave glasses, although the compulsory idleness was very irksome to her active mind. During her last illness, which continued during a half year, the condition of the eyes decidedly improved, with the exception of the central paralysis of the left eye. She did not complain so much of sparks and colors and of occasional herniopia: an improvement which I attributed to the more complete abstinence from writing, sewing, etc. I will only add that A. F., in her childhood, as well as her three sisters, enjoyed perfect sight, and that only one brother is short-sighted." Professor Arldt very briefly alludes to the detection of this change in the posterior segment of the eye by the ophthalmoscope.

Sichel, in a paper written in 1842, and published in *Graefe's Archives für Ophthalmologie*, Band iii., 2 Abth., p. 211, describes all the forms of staphyloma found in the sclerotic under the name of staphyloma choroideæ. He divides the subject into staphyloma choroideæ anticum, staphyloma corporis ciliaris, and staphyloma choroideæ posticum. Of the latter he says, "The posterior choroidal staphyloma is essentially the same as the anterior: like the latter, it is the result of an inflammation of the choroid and retina, sometimes also of the sclerotic, taken in connection with the thinning and agglutination of these membranes. This agglutination is at times only imperfect, but generally it is firm and inseparable over the whole extent of the staphyloma. Here and there may be found other points of agglutination of the membranes without staphyloma. All the three tunics participate in the adhesion, and yet it is found more frequently simply between the sclerotic and choroid.

The latter membrane is that which first suffers and undergoes greatest alteration by the disease. The progress of the affection, which can not be observed during life on account of its deep situation, and therefore is often overlooked, is slower than that of anterior staphyloma. It is the product of chronic inflammation ; and from causes as yet obscure it comes almost always upon one fixed spot, namely, upon the outer side of the optic nerve. At a later period a second and smaller staphyloma will form upon the opposite side of the nerve. This appearance of staphyloma upon the outer aspect perhaps depends upon the fact that the sclerotic is thinner here, and that according to Jacobson and Werle there is in the normal condition a certain amount of fluid between the choroid and sclerotic. Perhaps, however, this small quantity of fluid is the product of inflammation, which is excited most easily in this very spot, and, if not intense enough to cause adhesion of the membrane, results in a limited effusion of serum. It is certain that the effusion is not the essential cause of the staphyloma, and that no staphyloma choroideæ can be produced by the effusion of fluid between the sclerotica and choroidea, or between the latter and the retina. I have never, in numerous dissections of fresh eyes, found such an effusion. Whereas, in specimens which had for a long time been preserved, I have always found adhesion, so that there can be no thought of serous effusion between the tunics. In Jacobson's case hydrop sub-choroidialis had accidentally taken place, but was by no means to be regarded as the cause of the staphyloma, as will be further shown. On the contrary the cause consists in the adhesion.

" The microscope exhibits in the choroidal and ciliary staphyloma nothing but a thinning of the choroid, without softening in other parts of its extent. In its internal structure there is nothing seen but a tolerably large quantity of amorphous tissue, having little consistence, and containing fibroplastic elements. In the later periods of choroidal staphyloma the choroid becomes yet thinner and reduced to its stroma alone ; the retina loses its natural characteristics, its elements no longer are recognizable, being substituted in part by fibroplastic elements. When the retina and choroid are adherent, the former becomes thinned, and sometimes for a certain extent of surface disappears."

M. Sichel gives a detailed account of the dissection of two cases of posterior staphyloma, but the account of symptoms during life is very meagre. He says that in extreme cases the great protuberance causes strabismus convergens, exactly similar to ordinary muscular strabismus. But he has entirely omitted the myopia so characteristic of these cases, and this

affords a ready explanation of strabismus without supposing the necessity of a swelling of the posterior part of the bulb so great as to act mechanically.

Since the light of the ophthalmoscope has been shed upon the eye, the obscurity attending the beginning of this disease has quite disappeared. Professor Edward Jaeger, in his plates, *Beiträge zur Pathologie des Auges*, gives two illustrations which are very characteristic : one, of the disease in moderate degree and purely local, the other more extended and complicated with general atrophy of the choroid coat, as shown by the removal of its superficial layer of pigment. The former case is that of a person twenty-five years of age, who from the age of five had been near-sighted, and at fifteen began to wear glasses. These were of ten inches focus, and he had never been obliged to change them. Without them he read the finest print, No. 1 of Jaeger's test scale, at from two and a half inches to nine inches, and the coarsest print, No. 20, at twenty-five inches. In all respects, saving myopia, the symptoms were those of healthy eyes. The second illustration belongs to a patient of forty-five years, of scrofulous taint, myopic from childhood, and having suffered many things indicating congestion and inflammation of the choroid, such as feelings of pressure in the globes, appearances of colors and light, also vertigo. The external aspect of the eyes was normal in all respects. He could read with the right eye print No. 4, which is equivalent to ordinary newspaper type, only at one and a half to three inches distance ; with the left, print No. 8 at two to four inches distance.

M. Desmarres, *Maladies des Yeux*, vol. 3, page 428, devotes a chapter to the subject, illustrated with wood-engravings.

In the *Ophthalmic Hospital Reports*, of the Royal Ophthalmic Hospital, Moorfields, London, is a paper by Dr. Bader upon *Some Points connected with Near or Weak Sight*, vol. 1, page 116. It describes the usual appearances of the early stage of the disease, but contains one remarkable statement: "This crescent (which is seen adjacent to the entrance of the optic nerve), and with it the short sight, I have seen disappear in a patient after her third confinement." This recovery is quite contrary to the ordinary course of the disease. There are given two excellent colored plates of the ophthalmoscopic appearances. There are also given plates and accounts of other cases, which would seem to be the same disease in a more advanced stage, but not associating them with the former cases. Dr. Bader gives the microscopic examination of an eye, in which the vitreous had become fluid : "The retina being spread on glass, its hyaloid surface showed the following

appearances: to the extent of the white patch the nerve-tubes are indistinct, and the field is dimly granular; at its edges the nerve-tubes form dark shaded bundles, which, further on, assume their normal appearance; the nerve cells are distinctly seen beneath the abnormal as well as the normal portion of the optic nerve-fibres. The hexagonal cells, to the extent of the retinal changes, are deficient; a few brown pigment spots are scattered over the choroid, which is transparent to the extent of the retinal defect. The connections between retina, choroid, and sclerotic are normal: the sclerotic considerably thinned—most so round the entrance of the optic nerve. The hexagonal layer and choroid, while subjacent to the transparent retina, are normal." No allusion is made in this dissection to any protrusion of the sclerotic posteriorly, although it was thinned, because it was ruptured before the examination was made, and of course its form could not be described.

After this lengthened account of what has hitherto been known of the disease, the following may be given as the present knowledge on the subject:

Symptoms.—The only rational sign, to borrow the language of auscultation, in the uncomplicated cases, is myopia. It is important to note that this has at some time been suddenly developed, or has rapidly increased. This myopia, however, can not be perfectly corrected by concave glasses; the patient is obliged to hold the object unnaturally close in spite of them.

The objective signs, as revealed by the ophthalmoscope, are the discovery of a white line usually upon the temporal side of the optic nerve, separating it from the margin of the choroid coat. The line is at first faint, and might be thought to be merely a slight shrinking away of the choroid; it soon acquires a crescentic form, the horns and concave side applied to the nerve. If it increase in extent, it may take any irregularity of form. It spreads most rapidly toward the macula lutea, it may completely surround the optic disc, leaving it insulated. When of long duration and extensive, the borders of the figure are frequently indented with angular and projecting tips; these tips being at the points of entrance of the posterior ciliary arteries, which offer mechanical hinderance to the atrophic process. The border of the spot is marked by a black line of pigment, both upon the choroidal edge and upon the contour of the optic disc—unless the disease be just commencing or be advancing rapidly. If the white patch be large, specks of pigment may be scattered over its surface, and a few traces may be seen of the chorio-capillaries. The branches of the arteria and vena centrales retinæ cross the white spot, and shine with unusual distinctness upon the bright surface behind them. Because of the

clear relief into which they are brought, the finer twigs, usually not noticed, are brought into view, giving the appearance of undue vascularity. When the white spot or crescent is small, it may easily be overlooked and be supposed to belong to the optic nerve; but when larger, the difference in the intensity with which the two surfaces reflect the light becomes apparent. The denuded sclerotic coat shines through the retina with greater brilliancy.

The disease is considered as a circumscribed inflammation of the choroid and sclerotic tunics, such as takes place in the anterior portions of the choroid, and in the ciliary body. The retina is always found covering the white spot, sometimes small grayish spots are scattered over it, but these are not constant. Under the microscope its elements are found altered, as described by Dr. Bader and M. Sichel. In the disease found in a rabbit's eye, Dr. Weber observed the layer of rods and cones much deranged, as if mechanically broken. The choroid suffers to the greatest degree. The hexagonal pigment cells, or at least their contents, are always removed, and the chorio-capillaries, if not quite gone, becomes much atrophied. There may be exudations of plastic lymph upon this spot, and the choroid and sclerotic are generally closely adherent to each other. The sclerotica becomes exceedingly thin, and yields to the pressure of the contents of the globe, forming the staphyloma. This increase in the antero-posterior axis of the eye, necessarily alters its dioptric conditions. The retina is removed to a plane behind the natural focus of the refractive media; and to compensate for this, the object must be brought closer to the cornea, that its image may be formed in the retina. This is the ready explanation of the myopia. Besides bringing the object closer to the eye, the patient taxes his power of accommodation to the utmost to gain a distinct image on the retina, and, this increasing, the intra-ocular pressure tends to increase the projection of the sclerotic.

The complications which are liable to take place are, first, changes in the vitreous humor. These are, the occurrence of opacities which are of two forms, either delicate semi-transparent membranes, which slowly float up and down, and become distinct by being thrown into folds; or, secondly, minute points, or molecules, filling the humor, and giving it a general hazy aspect. The former may be supposed to be the thickened and degenerated septa of the hyaline membrane; the latter are due to sero-bloody effusions, and always appear suddenly. This latter effusion prevents the observer from getting a sharp view of the retina. Besides the occurrence of opacities, the vitreous may become, in whole or in part, liquefied; it may be diffluent only

at its posterior portion, or totally, so as to cause the iris to be tremulous. In connection with these changes in the vitreous, an opacity is often developed upon the posterior pole of the crystalline lens, and this may increase to complete cataract. When the staphyloma is considerable, the retina may become separated from the other membranes at the projecting spot, and the subjacent space be filled with serum. This separation is very likely to increase by any addition of pressure, and by the flow of the serous fluid to the bottom of the eye, pushing off the retina. In this case, the upper half of the patient's field of vision will be entirely obscure. Sometimes the "yellow spot" becomes the seat of serious changes, namely, increased deposition of pigment, with atrophy of the choroid. In these cases, the patient will complain of a central shadow always before his sight.

As described in cases condensed from Prof. Arldt and Prof. Edward Jaeger, the choroid in general may be involved in congestion and chronic inflammation. This will be evidenced by luminous and colored spectra, and with feelings of tension and occasional pain in the eyes; at the same time the iris may show no sign of the mischief going on in the posterior parts of the great vascular coat of the eye. The pressure upon the staphylomatous portion of the globe may become so great as to cause depression of the optic nerve. It may be seen by the ophthalmoscope to become hollowed, in this case vision rapidly declines as the result of the paralyzing influence of pressure upon the nerve-fibres.

An examination of the dark spots in the field of vision, caused by the normal insensibility to light of the surface of the optic nerve, shows that, in the more advanced cases of sclerotico-choroiditis posterior, this dark spot is increased in area, although not always absolutely without any perception of light. When the white patch in the eye is extensive, its brilliant reflection of rays upon other parts of the retina causes confusion in the perception of images, and dazzles the sight.

In consequence of the different refractive power of the two eyes, when the disease is confined to one only, the vision of the affected eye interferes with that of the other, since the focal distance must be different for each. On this account, patients usually suppress involuntarily the impression on one eye, and to do this more perfectly, strabismus often takes place. The affected eye may deviate either outward or inward, causing strabismus, divergens, or convergens.

Lastly, other parts of the choroid and sclerotic may become affected causing staphylomata at the equator and at the anterior parts of the globe.

An important point to settle is, whether the disease be stationary or progressive. It may be known to be progressive if the patient has pain in the brow and temple; if there be luminous and colored phantasms; if the myopia is increasing; by the ophthalmoscope, if the edge of the choroid be not limited by a black border of pigment, but the white spot gradually shades off into the choroid; if other white spots appear at neighboring points and detached from the original one. This is the chief point of diagnosis, because upon it depends the mode of treatment.

The duration of the disease is indefinite. Restitution of the choroid and reduction of the staphyloma can not be expected. On the contrary, when once stationary, the disease will remain *in statu quo* for very many years.

Prognosis will be based upon the present state of the disease and the existence of complications. If there have been but little change, and the condition be stationary, prognosis is good. A slight haziness of the vitreous may clear up. Detachment of the retina and fluidity of the vitreous are incurable.

Causes, according to Prof. Graefe, are two-fold: first, congestions of the eye, following congestions of the head, constipation, or other venous obstructions; and, secondly, the undue taxation of the power of accommodation. This occurs in straining the eye over fine objects, in working in a dim light, and in the use of ill-fitting spectacles. The mischievous effect is produced by direct muscular pressure of the tensor choroideæ and by hinderance to the venous circulation.

Treatment.—This must be settled by the condition of the disease. If it be on the advance and active, as known by the pain in the brow and temple, and the signs enumerated above, the antiphlogistic plan must be carried out proportionate to the patient's strength. Blood to be taken from the temple by cupping or the artificial leech, not by natural leeches, as the stream is too slow to affect the deep circulation of the eye. After the abstraction of blood, the patient should go to bed and remain twenty-four hours in a darkened room, to avoid the congestive reaction. Prof. Graefe strongly insists upon and carries out this precaution in treating all the congestive and inflammatory diseases of the deeper structures of the eye. Without it, the effect may be, under the stimulus of reaction, an augmentation of the congestion. The use of purgatives will depend upon the state of the intestinal secretions. Likewise, the sitz-bath may be very effectual as a derivative. Cold lotions, i. e., water at temperature of 65° to 75° applied several times a day, have a decided effect upon the congestion, by their cooling influence; still more effectual is the eye-douche, if not too powerful. If

there be exudations in the choroid, corrosive sublimate, in doses of $\frac{1}{10}$ to $\frac{1}{6}$ of a grain daily, becomes highly useful. If the person have suffered from syphilis, or from strumous glandular affections, iodide of potassium will be beneficial. Use of the eyes upon small objects must for the time be prohibited.

If the disease be stationary the cold lotions may be employed, but the person must still use great caution with his eyes. Reading, writing, sewing, etc., are to be reduced to the smallest amount, and the effort to be frequently intermitted. Concave glasses for this purpose are to be avoided, because they diminish the apparent size of the objects, while the patient strives, by bringing the object still closer, to gain a larger image, because he is amblyopic as well as myopic. This conflict of opposing conditions results in the patient's damage by over exertion of his power of accommodation. In regard to seeing distant objects; in walking on the street if, for example, –4 or –5 make objects distinct to the patient, then let him have glasses –6 or –8 to be sure his eyes will not be strained. It is better that the glasses be tinged slightly with cobalt blue, to interrupt the yellow rays which are those most injurious to the eye. Smoked glasses intercept the rays of all colors and are not so well adapted as the blue.

This, then, is the general plan of management. For certain special conditions, such as cataract, something may be said. If far advanced, and the vitreous fluid, nothing can be done. If the opacity be only at the posterior pole of the lens, and the iris not tremulous, extraction may be performed. But if there be reason to suspect detachment of the retina because of the limitation and darkness of any part of the field of vision, no operation is to be done. The operation must be looked upon as done under great disadvantages at the best.

If strabismus exist and the myopia be not excessive, an attempt may be made to cure it, if desired; but perfect success can not always be expected, because if only one eye be affected, the stronger eye performs the act of vision almost to the exclusion of the other.

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